Drinking Water Surveillance Program reports for 1998 and 1999

The Drinking Water Surveillance Program (DWSP) began in 1986 at 22 water supply systems. By the end of 1999, 162 municipal waterworks were being monitored. They account for over 88 per cent of the population served by municipal water supplies.

The executive summaries and detailed reports for the 162 municipal waterworks that were monitored during 1998 and 1999 are provided on this Web site as part of the Ontario government's commitment to make information about drinking water available to the public on an ongoing, regular basis.

The Ministry of the Environment has developed new rules to ensure that information about ongoing drinking water testing is disclosed to the public on a regular basis.

Standard DWSP practice in 1998 and 1999 was to inform the operating authority and the Ministry of the Environment district manager when a health objective was exceeded. It is up to the operating authority to then notify the local medical officer of health. Analytical results are sent to the operating authority when the analyses are completed.

• For background information on the program, including information about parameters that are monitored by the program, click here.

• For a summary of each water treatment plant, click here (in pdf format 240k/163 pages)

• For data on water treatment plants chose location on the map.

Drinking Water Surveillance Program (DWSP) background information

DWSP is a monitoring program developed to provide reliable and current information on municipal drinking water. Collected data are used to:

- monitor levels of chemicals and establish trends
- define and track the occurrence of new chemicals
- provide data in support of drinking water standards setting
- assess treatment plant operations.

Water supply systems are included in the program based on population served, geographical location and risk of contamination.

DWSP is not a compliance monitoring program. That responsibility lies with the operating authority for each municipal water supply, which is required to monitor the quality of the drinking water provided to the consumer and ensure its safety. Participation of operating authorities in DWSP is voluntary and DWSP data are routinely sent to them once the laboratory has completed the analysis.

Results show that the municipalities that were monitored by DWSP for the period 1998 to 1999 produced good quality water for their communities. Over 309,000 analytical tests (inorganic, organic and radiological) were performed on raw water, treated drinking water and water in the distribution systems. Ninety-one test results in the 1998 and 1999 period of DWSP sampling were above a health-related Ontario Drinking Water Objectives (ODWO)[1]. The health-related objectives for flouride, turbidity, nitrates, lead, selenium, total trihalomethanes, N-nitrosodimethylamine (NDMA), and chloramines were exceeded on at least one occasion at 26 locations for the 1998 and 1999 monitoring period.

Drinking water characteristics

In Ontario, drinking water is provided by rivers, lakes, streams, ponds,

reservoirs, springs and wells. As water travels through the ground or over the surface, it dissolves naturally occurring minerals and radioactive material and can absorb substances resulting from the presence of animals or human activity.

Categories of substances that may be present in source waters include:

• Microbiological substances, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

• Inorganic substances, such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

• Pesticides and herbicides which may come from a variety of sources such as agriculture, stormwater runoff and residential use.

• Organic substances, synthetic and volatile, are by-products of industrial processes and petroleum production and can come from gas stations, urban stormwater runoff and septic systems.

• Radioactive materials which can occur naturally or result from nuclear power production and mining activities.

DWSP PARAMETER GROUPS

The following paragraphs describe the parameters (physical characteristics such as colour, pH and temperature or chemical substance) that DWSP monitors.

Inorganic parameters

Physical/chemical

Physical/chemical parameters, for the most part, are naturally occurring in the source water. The water treatment process is designed to reduce the levels of these parameters.

Fluoride is a chemical substance that may be added to municipal water during the treatment process to promote strong teeth. Fluoride can also be present in the source water as a result of erosion of natural deposits or discharge from fertilizer and aluminum factories. Eight tests for fluoride were detected above the ODWO in 1998 and 1999 .

Nitrates are present in source water as a result of run-off from fertilizer use, leaching from septic tanks, sewage and erosion from natural deposits. Two tests for nitrate were detected above the ODWO in 1998 and 1999 .

Turbidity in water is caused by the presence of suspended matter such as clay, silt and microscopic organisms and is commonly present in the source water as a result of soil runoff. Turbidity can serve as a source of nutrients for micro-organisms and interfere with their enumeration. A total of 38 turbidity tests were detected above the ODWO of one nephelometric turbidity unit (NTU) for water entering the distribution system in 1998 and 1999. Three sites with groundwater sources accounted for 17 turbidity tests detected above the ODWO and 10 sites with surface water sources accounted for 21 turbidity tests detected above the ODWO. Turbidity in treated surface water may be an indication that the treatment process is not optimized to remove particles. The risk that the turbidity could consist of cysts or other matter that could shield bacteria from disinfection is greater in surface water sources than in ground water sources.

Metals

Metals, for the most part, are naturally present in source water, or are the result of industrial activity. Some, such as copper and lead, may enter the drinking water from plumbing in the distribution system.

Lead can occur in source water as a result of erosion of natural deposits. The most common source of lead is corrosion of household plumbing. First flush water at the consumer's tap may contain higher concentrations of lead than water that has been flushed for several minutes. Ten tests for lead were detected above the ODWO in 1998 and 1999.

Selenium occurs naturally in waters at trace levels as a result of geochemical processes such as weathering of rocks and soil erosion. It is difficult to establish levels of selenium that can be considered toxic because of the complex interrelationships between selenium and dietary constituents such as protein, vitamin E, and other trace elements. Four tests for selenium were detected above the ODWO in 1998 and 1999.

Mercury and *cyanide* have never been detected above a trace level in DWSP results for treated water.

Organic parameters

Organics make up 83 per cent of the total number of parameters tested by the DWSP, yet they are seldom detected in drinking water. Organic parameters are grouped accordingly:

Chloroaromatics

Parameters classified as chloroaromatics are present in surface water as a result of industrial activity. They are by-products of certain processes of chlorination of hydrocarbons.

Chlorophenols

The ODWO for total phenols was replaced by ODWOs for specific, more sensitive individual chlorophenols. Ten individual chlorophenols are tested for in the DWSP.

N-nitrosodimethylamine (NDMA)

N-nitrosodimethylamine (NDMA) or its precursors may be present in the source water as a result of industrial discharge or from sewage/animal waste effluents combined with nitrite from anaerobic decay of organic waste matter. NDMA has been detected as a by-product in a certain blend of coagulant and polymer used in the treatment process. Four tests for NDMA were detected above the ODWO in 1998 and 1999.

Disinfection by-products

Chloramines (Combined Chlorine) are produced during the disinfection process when aqueous chlorine and ammonia are mixed. Chloramines can be used to maintain a chlorine residual for long periods of time in the distribution system. Chloramines assist in the control of certain taste and odour problems caused by chlorination and keep trihalomethane formation to a minimum. Two tests for chloramine were detected above the ODWO in 1998 and 1999.

Trihalomethanes (THMs), by-products of drinking water chlorination, occur during the treatment process. Trihalomethanes are comprised of *bromoform, chloroform, bromodichloromethane* and *chlorodibromomethane*. THM's do not exceed the ODWO on the basis of a single test result, but on a running average of four quarterly test results in the distribution system. THM's were detected above the ODWO criteria on 23 occasions in 1998 and 1999.

Haloacetic Acids (HAAs) are another category of disinfection by-products that will occur in chlorinated waters as a result of the water treatment process. Haloacetic acids are comprised of *monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, bromochloroacetic acid,* and *dibromoacetic acid.* Results are reported for the individual compounds as well as for total HAAs. There is presently no Ontario Drinking Water Objective (ODWO) for HAAs.

Polycyclic aromatic hydrocarbons (PAHs)

The presence of *PAHs* in the environment is principally associated with the combustion of organic matter, including fossil fuelstested for in DWSP. Benzo (a)pyrene is the only PAH for . Seventeen PAHs are which an ODWO has been established and no detections above the ODWO were observed.

Polychlorinated biphenyls (PCBs)

PCB's are among the most ubiquitous and persistent pollutants in the global ecosystem. In the past, PCB's have been marketed extensively for a wide variety of purposes but their use in Canada is currently being phased out. Results of the DWSP show that *PCBs* have never been detected in either the treated drinking water or the raw water.

Volatiles

Volatile organics are generally present in source water as a result of recreational and industrial activity. Twenty-six volatiles, in addition to disinfection by-products discussed above, are tested for in DWSP.

Pesticides

Atrazine is the pesticide most commonly detected in Ontario's municipal drinking water. The presence of atrazine and other pesticides at trace levels indicates that the raw water source is affected by agricultural activity. No pesticides were detected at levels greater than the ODWO in 1998 and 1999. .

Radionuclides

There are more than 200 radionuclides, some of which occur naturally and others which originate from the activities of society. The radionuclide of concern in Ontario drinking water supplies is tritium. *Gross beta* and *gross alpha* determinations are preliminary screens for all radionuclides with the exception of tritium which must be measured separately. Results of the DWSP show that tritium has never been detected above the ODWO in either the treated drinking water or the raw water.

Taste and odour causing parameters

Taste and odour episodes in drinking water have become more prevalent in Ontario over the past five years. They are caused by the decomposition of blue-green algae and generally occur after the algae blooms in the late summer. The compounds most frequently associated with taste and odour are *Geosmin* and *MIB (2-methylisoborneol)*. Although geosmin and MIB can impart nuisance taste and odour at very low levels, no health related or aesthetic guidelines have been established.

Geosmin and *MIB* are not monitored routinely under the DWSP. However, special surveys are conducted at selected sites during specific times of the year. When water works experience taste and odour problems they can request special sampling for these parameters.

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[1]Ontario Drinking Water Objectives for health related parameters became Drinking Water Standards on August 8, 2000 as part of the Drinking Water Protection Regulation O.Reg. 459/00.

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